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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/593,832	11/21/2006	Tadatoshi Kurozumi	Q80768	5492

23373 7590 10/02/2008

SUGHRUE MION, PLLC
2100 PENNSYLVANIA AVENUE, N.W.
SUITE 800
WASHINGTON, DC 20037

EXAMINER	
NGUYEN, COLETTE B	
ART UNIT	PAPER NUMBER
4162	
MAIL DATE	DELIVERY MODE
10/02/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/593,832	KUROZUMI ET AL.	
	Examiner	Art Unit	
	COLETTE NGUYEN	4162	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09/06/07*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *0/22/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. **Claim1-32** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohmori et al. (PCT/JP99/06876) and further in view of Tanaka et al (PCT/JP00/05794). Ohmori teaches a perovskilte type composite oxide containing titanium oxide with formula $M(TiO_3)$ wherein M is at least one selected from Ca, Sr, Ba, Pb, and Mg and $D_1=6/p$ where p is the particle density and S is the specific surface area of the particles. The preferred process method is hydrolysis of titanium tetrachloride precursor in alkaline solution. However he does not teach vapor-phase method. Tanaka et al, on the other hand teaches titanium oxide particles process, also from titanium chloride precursor, using vapor phase method, mainly for cosmetics with little aggregation and having highly excellent dispersibility. It would have been obvious for one of ordinary skill in the art at the time of the invention to combine the teaching of Ohmori and Tanaka as both teach method of making titanium oxide compound using titanium tetrachloride as a precursor to produce titanium-containing mixed oxide particles having a small particle size and excellent dispersibility at a low cost for a perovskite type product.

Regarding claim 1. Ohmori in view of Tanaka disclose a method for producing a titanium-containing perovskite compound, characterized in that the method comprises a step of reacting titanium oxide produced through a vapor-phase method with at least one element selected from a group of alkaline earth metal compound and Pb compound in an alkaline solution. Ohmori (Abstract and para 0019 and para 0023) and Tanaka (Abstract).

Regarding claim 2. Ohmori in view of Tanaka disclose a method for producing a titanium-containing perovskite compound as claimed in claim 1, wherein primary particles of the titanium-containing perovskite compound have a diameter (D1) that is 50 to 200% the size of primary particles of the titanium oxide serving as a starting material, the size (D1) being determined by converting the specific surface area (S) of the particles obtained by the BET method to the total surface area of spheres in accordance with the following equation (i):

$D1 = 6/pS$ (i)

wherein *p* represents a density of the particles and S represents a BET specific surface area. Ohmori (Abstract).

3. Regarding claim 3. Both Ohmori and Tanaka teach a BET specific surface area of 3-200 m^2/g. Tanaka (Abstract) and Ohmori (para 0013).

4. Regarding claim 4. Tanaka discloses The method for producing a titanium-containing perovskite compound as claimed in claim 1, using the titanium oxide produced by oxidizing titanium tetrachloride at high temperature by use of an oxidizing gas. Tanaka (Abstract).

5. Regarding claim 5. Ohmori in view of Tanaka disclose a method for producing a titanium-containing perovskite compound as claimed in claim 4, using the titanium oxide produced by a vapor-phase method is produced by respectively introducing a titanium tetrachloride-containing gas and an oxidizing gas which are heated in advance to 500°C or higher into a reaction tube at a flow rate of 10 m/sec or more. Tanaka (para 0012 and para 0013).

6. Regarding claim 6. . Ohmori in view of Tanaka disclose a method for producing a titanium-containing perovskite compound as claimed in claim 5, using the titanium oxide produced by retaining the titanium tetrachloride-containing gas and the oxidizing gas in the reaction tube for one second or shorter under a high-temperature condition higher than 600°C. Tanaka (para 0014).

7. Regarding claim 7. Ohmori in view of Tanaka disclose a method for producing a titanium-containing perovskite compound as claimed in claim 6, using the titanium oxide produced under a condition of an average gas flow rate in the reaction tube of 5 m/sec or more. Tanaka (para 0015).

8. Regarding claim 8. Ohmori in view of Tanaka disclose a method for producing a titanium-containing perovskite compound as claimed in claim 1 using the titanium oxide produced by a vapor-phase method is produced by introducing the preheated titanium tetrachloride-containing gas and oxidizing gas into the reaction tube in such a manner that turbulence is generated in the reaction tube. Tanaka (para 0045)

9. Regarding claim 9. Ohmori in view of Tanaka disclose a method for producing a titanium-containing perovskite compound as claimed in claim 8, using the titanium

oxide produced by introducing the titanium tetrachloride-containing gas and the oxidizing gas into the reaction tube through a coaxial parallel flow nozzle and the inner tube of the coaxial parallel flow nozzle has an inside diameter of 50 nm or less(para 0017).

10. Regarding claim 10. Ohmori in view of Tanaka disclose a method for producing a titanium-containing perovskite compound as claimed in claim 4 wherein the titanium-tetrachloride-containing gas has a titanium tetrachloride content of 10 to 100%. Tanaka(para 0018).

11. Regarding claim 11. Ohmori in view of Tanaka disclose a method for producing a titanium-containing perovskite compound as claimed in claim 5, wherein each of the titanium tetrachloride-containing gas and the oxidizing gas is heated in advance at 800°C or higher. Tanaka (para 0019).

12. Regarding claim 12. The method for producing a titanium-containing perovskite compound as claimed in claim 1, wherein the titanium oxide produced by a vapor-phase method has a mean particle diameter at a 90% cumulative weight on the particle size distribution curve (D90) of 2.2 μm or less. Tanaka (para 0020).

13. Regarding claim 13. Ohmori in view of Tanaka disclose a method for producing a titanium-containing perovskite compound as claimed in claim 1, wherein the titanium oxide produced through a vapor-phase method has a distribution constant n, as calculated from the following Rosin-Rammler equation (2), of 1.7 or more:

$R=100\ \exp(-bD^{n)}$ (2)

wherein D is a particle diameter; R is the percentage of the number of particles larger than D(particle diameter) with respect to the total number of particles; n is a distribution constant; and b is a reciprocal of particle characteristic constant. Tanaka (para 0021).

Regarding claim 14. Ohmori in view of Tanaka disclose a method for producing a titanium-containing perovskite compound as claimed in claim 1, wherein the titanium oxide produced by a vapor-phase method contains anatase-crystal-form titanium oxide. Tanaka(para 0035*," The fine particulates of titanium oxide of the present invention may be contained as a pigment or a particle component using the photocalytic effect in various compositions".* Only anatase crystal form of titanium oxide exhibits this characteristic, not the brookite type.

14. Regarding claims 15 and 16. Ohmori in view of Tanaka disclose a method for producing a titanium-containing perovskite compound as claimed in claim 1, using an alkaline solution in which a basic compound exits and wherein the basic compound is selected from ammonium, organic amine and hydroxide of ammonium salt. Ohmori (para 27, 28). Despite that "organic amine" is not specified, it would have been obvious for one of ordinary skill in the art to select organic amine as it is an organic alkali compound such as ammonium tetramethyl hydroxide as taught by Ohmori.

15. Regarding claim 17. See discussion set forth above for claim1

16. Regarding claims 18,19,22,23,24,25,26,27,28,29,30,31,,32. Ohmori in view of Tanaka teach all the instant claims by disclosing all the functional applications including and not limited to dielectric materials, pierzoelectric , memory media and photocatalysts such as thin-film, ceramic, electronic devices. Ohmori (para 53 and claims 8-16)

Regarding claims 20 and 21. Ohmori in view of Tanaka disclose a paste and slurry containing titanium-perovskite compound as claimed in claim 18. (See the examples in both references)

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to COLETTE NGUYEN whose telephone number is (571)270-5831. The examiner can normally be reached on Monday-Thursday, 10:00-4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer Mc Neil can be reached on (571)-272-1540. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/COLETTE NGUYEN/
Examiner, Art Unit 4162

/Jennifer McNeil/
Supervisory Patent Examiner, Art Unit 4162